

Space News Roundup

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National Aeronautics and Space Administration

'State of the Center' message

Griffin outlines the challenges ahead

STS 41-D launch now scheduled for August 29th

The maiden flight of the Space Shuttle Orbiter *Discovery* is now scheduled to launch from the Kennedy Space Center Aug. 29, NASA announced last week.

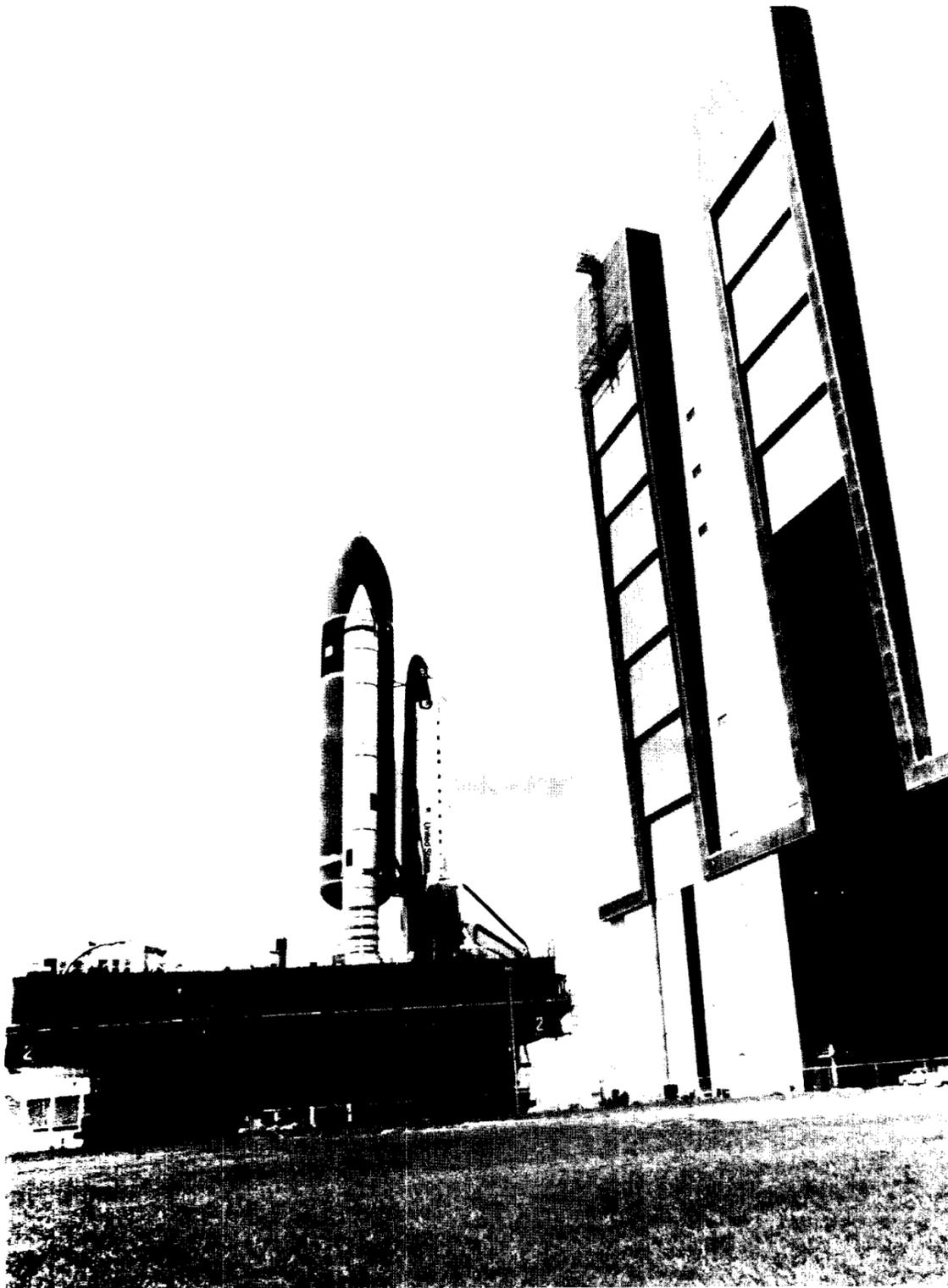
The launch for STS 41-D is scheduled for 8:35 a.m. EDT with a landing Sept. 4 at 6:31 PDT at Edwards Air Force Base, California.

The mission cargo, consisting of payloads from the original 41-D and 41-F complements, will consist of three communications satellites—the Hughes Leasat, the Satellite Business Systems SBS-D, and AT&T's Telstar 3-C. Other payloads will include the OAST-1 package sponsored by NASA's Office of Aeronautics and Space Technology, and the McDonnell Douglas/Johnson and Johnson Block III electrophoresis system.

The original six member crew for 41-D will be in place launch morning. Commander is Hank Hartsfield, Pilot is Michael Coats, and the Mission Specialists are Judith Resnik, Steven Hawley and Richard Mullane. Charles Walker of McDonnell Douglas will be the first Payload Specialist to fly in the program.

Discovery was moved back to Pad 39A at the Kennedy Space Center on Aug. 8. Following the launch abort of 41-D in late June, the Shuttle stack was rolled back and the Orbiter was demated. Teams then consolidated the cargos from Missions 41-D and 41-F and the *Discovery* was then mated again.

During the rollout to the pad, small variations in the alignment of the Mobile Launch Platform (MLP) resulted in an overall misalignment of about three inches. Officials were concerned that critical connections, such as the Orbiter mid-body umbilical connector or the hypergolic servicing connectors, might not mate. The launch team repositioned the MLP on Friday, and over the weekend checked the fits by closing the Rotating Service Structure around the Shuttle stack.



Back to the Pad

The Orbiter *Discovery* exits the Vehicle Assembly Bldg. at the Kennedy Space Center last week on the way back to Pad 39A as preparations continue for the STS 41-D launch Aug. 29. The Orbiter had been rolled back and demated so payloads from 41-D and 41-F could be consolidated in the cargo bay. *Discovery* will carry three communications satellites on this flight, a record.

"The state of the Center is excellent," JSC Director Gerald D. Griffin said Aug. 9 when he met with most of the Center's organizational managers and supervisors for the first of what may turn into a regular series of gatherings with employees.

"We have a lot of challenges in front of us," Griffin said in surveying the changes and challenges which face the Center in its 23rd year. "Usually out of challenge you get a lot of opportunity. But make no mistake. Our plate is very full. We have an enormous set of tasks in front of us. But it sure beats the alternative."

In the course of the 90-minute gathering, Griffin highlighted the status of the Center in its three major areas of responsibility: the Space Shuttle, the Space Station and, in Griffin's words, "providing a setting which offers challenges and a future for our people."

With continued Space Shuttle operations, and with the Space Station effort now reaching higher and higher levels of activity, Griffin said, JSC faces heavy management, research, development and operational responsibilities "for a virtually unending period of operations, at least on a horizon we can realistically deal with." One of the greatest challenges, he said, will be to juggle the Center's manpower resources to meet those tasks. "I've been telling anyone who would listen to me that JSC can handle both jobs."

The Space Shuttle

Griffin said JSC is now faced with taking a busy federal workforce, one which has been consumed with bringing the Space Shuttle on line and into operations, and redirecting the focus to handle both the Shuttle and Space Station projects.

A central factor in the future role of the federal employees here, he said, is NASA management's decision to build and retain a systems engineering and integration (SE&I) capability for Space Station within the government ranks. SE&I and all it involves, he said, will be the core of knowledge and expertise for the Station, and the Agency wants that capability to reside in-house if the facility is

(Continued on page 3)

\$200 million ACTS contract signed

The Lewis Research Center has awarded a \$260,304,000 contract to an industry team headed by RCA's Astro-Electronics Group for design, development and fabrication of the Advanced Communications Technology Satellite (ACTS), regarded as the most advanced and complex space communications system in U.S. history.

The advanced satellite is to be ready for launch by the Space Shuttle in 1989.

Other major participants of the industry team are: TRW Electronics Systems Group, Space Communications Division, Redondo Beach, California; Communications Satellite Corporation, Washington, D.C.; Motorola, Inc., Aerospace Electronics Office, Scottsdale, Arizona;

Hughes Aircraft Company's Electron Dynamics Division, Torrance, California; and Electromagnetic Services, Inc., Norcross, Georgia.

Contract specifications call for a flight spacecraft, ground systems and operations. The contract calls for the work to be split among the several contractor facilities. Lewis has project management responsibility for the program.

Under terms of the multi-year agreement, RCA Astro-Electronics will be responsible for construction of the spacecraft and integration and testing of the ACTS system. COMSAT will be responsible for the design and development of a master control station, a NASA ground station, and operations and maintenance during the period when the experimental satellite is

in space. TRW will be responsible for development of the multibeam communications package that will include a multibeam antenna, a baseband processor, low-noise receivers and traveling wave tube transmitters.

In announcing the contract award Lewis Director Andrew J. Stofan said development of the ACTS technologies will help to maintain U.S. preeminence in satellite communications, now a \$2 billion-dollar-a-year business.

"With ACTS, NASA and U.S. industry will work together to address required advances in frequency reuse through multiple spot beams, beam hopping and on-board switching and signal processing as well as operating at higher frequencies in the 30/20 gigahertz

Ka-band," Stofan said.

"These advances will be needed by future commercial space communications systems to be introduced in the 1990's in order to permit a more efficient use of satellite orbit positions and radio frequency resources and to allow for new forms of communications and data transfer."

"Technologies to be tested in the ACTS program could lead to at least a five-fold increase in satellite communications capabilities in the 1990s," predicts Joseph N. Sivo, Chief of Lewis' Space Communications Division.

"These capacity increases will be necessary to meet the rapid expansion of telephone, television, teleconferencing, electronic mail, data communications and other

communications satellite traffic for the rest of this century — growing roughly at 20 percent per year," said Sivo.

At present, the most widely-used frequency band for domestic communications satellites is the C-band (from 4 to 6 gigahertz) but this part of the radio spectrum is now saturated. While there is still additional space available in the Ku-band (14/12 GHz), market studies show that these frequencies too will be completely utilized by the early 1990s. To permit further expansion of satellite communications service in the United States, there must be more efficient use of the spectrum currently in use, plus employment of the next higher frequency band, the Ka-band (30/20

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Space News Briefs

Solar Polar renamed "Ulysses"

The joint ESA/NASA International Solar Polar Mission has been renamed Ulysses, in honor of Homer's mythological hero and Dante's description, in the 26th Canto of his *Inferno*, of Ulysses' urge to explore "an uninhabited world behind the sun." The mission involves sending a probe to make measurements of the Sun from an orbit about its poles, the first time a spacecraft will have left the ecliptic plane to take such readings. In order to reach this out-of-plane position, Ulysses will be launched from the Shuttle in the spring of 1986 and sent to Jupiter for a gravity assisted swing back towards the polar latitudes of the Sun more than three years after its initial launch. Ulysses is designed to investigate the properties of the solar wind, the structure of the Sun/solar wind interface, the heliosphere and its magnetic field and solar and galactic cosmic rays and cosmic dust.

Lockheed ships final OV 104 tiles

Some twenty years after its research and development program for a thermal protection system began, the Lockheed Missiles and Space Co. has completed the final tiles for Orbiter Vehicle 104, the *Atlantis*, the last Orbiter on the production line. More than 100,000 have been produced during the program. A. Bruce Burns, Lockheed's TPS Program Manager, said the experience gained in producing the tiles has shown up in the yield from the factory. About 43 out of every 100 tiles produced passed inspection during the production for *Columbia*. Now, he said, about 93 out of every 100 have been accepted for *Atlantis*.

Improved velocimeter used at Ames

For several years now, the aeronautical research community has been using lasers to gain highly precise data in wind tunnel tests. Now comes a new and improved version, a device known as the Long Range Laser Velocimeter, that is being used in tunnels at the Ames Research Center. The laser device provides more complete aerodynamic data than was previously possible. It can measure engine intake and exhaust flow patterns, aircraft wake plumes, wing flow vortices and overall air flow separation. But best of all, it's reusable. Previous velocimeters have, for the most part, been constructed for individual test series, and were then redesigned or discarded, depending on the nature of particular tests. The velocimeter in use at Ames can be reconfigured for a variety of tests. Its two converging laser beams are computer controlled and can be rotated or raised and lowered to change the orientation of the measurement area. This means the instrument can provide detailed data from separate aircraft parts. Resolution of the beams ranges from as far away as 60 feet from the test model to as close as 7.5 feet.

Bulletin Board

PC Organization to meet

The Bay Area PC Organization will meet at 7:30 p.m. Aug. 21 in the ballroom at the Holiday Inn on NASA Road 1. A representative from Lotus will be on hand to demonstrate that company's latest spreadsheet product, "Symphony." All members, prospective members and friends are invited. Several computer vendors will be displaying their wares outside the meeting room. For more information, call Earl Rubenstein at x3501 or Joe Hartman at x3811.

Caltech to hold planetology conference

The Geological and Planetary Sciences Division of the California Institute of Technology has issued a call for papers for a conference to be held on comparative planetology in 1985. "The Terrestrial Planets: Comparative Planetology" will be held at Caltech in June 1985. The conference is an attempt to merge several areas of study in the field and will lead to a comprehensive review book as part of the Space Science Series of the University of Arizona Press. For more information, contact David J. Stevenson, Division of Geological and Planetary Sciences, Caltech 170-25, Pasadena, CA 91125. Stevenson can also be reached at (818) 356-6534.

Alley Preferred Passes available

The Alley Theatre Preferred Pass is again being offered for the 1984-85 season to NASA employees and contractors. Each preferred pass consists of six coupons which may be redeemed for the best available seats for any Alley production on either stage. The program is designed for maximum flexibility and convenience. The price is \$49. Brochure forms which explain the program are available at the Bldg. 11 Exchange Store or from your EAA representative. For more information, call Doris Wood at x6545.

NMA to meet Aug. 22

The next meeting of the JSC Chapter of the National Management Association will be held beginning with a social hour at 5 p.m. Aug. 22. A dinner will follow at 6 p.m. The guest speaker for the evening will be Robert D. Gilbert, President and Plant Manager of Rohm and Haas in Bayport. Dinner is covered under NMA membership dues, but those who plan to attend should contact Cecil Dorsey at x2891 to confirm their reservations. The first training session sponsored by the JSC NMA, "Introduction to First Level Supervision," will begin in September. For more information on the training session, call Dorsey or Estella Gillette at x3895.

NARFE meeting is Sept. 4

The National Association of Retired Federal Employees will meet at 6 p.m. Sept. 4 in the Harris County Park Bldg. on NASA Road One. The dinner meeting is open to all JSC retirees and those employees planning retirement. For more information, call Burney Goodwin at 334-2494.



Members of the ever growing 41-G crew posed for a portrait recently in Bldg. 8. Seated, from left to right, are Pilot Jon McBride, Mission Specialists Sally Ride, Kathy Sullivan and David Leestma. Standing, from left to right, are Payload Specialist Paul Scully-Power, Commander Robert Crippen and Canadian Payload Specialist Marc Garneau.

Neal to leave space beat

Roy Neal, the veteran space correspondent for NBC News, will be leaving the space beat effective this month in order to concentrate on developing new communication technologies for the network.

As Deputy Los Angeles Bureau Chief for News Operations, Neal will be going back full circle to a job he first began in 1952. Neal began working in Los Angeles in 1952 to set up NBC's West Coast Bureau, taking advantage of the first transcontinental loop for feeding video and audio which came into use that year.

In his new role with the network, Neal will be concentrating on technologies which are the successors of that first transcontinental loop. "It really has come full circle," he said. "In 1947, the NBC Network consisted of three stations, one in New York, one in Philadelphia and one in Washington, D.C. They all originated and fed news to each other. Then along came a new

technology, where it was possible for a central source to receive and disseminate news. As time went on, the sheer basic technology took over, and we have really been wading in molasses for 30 years."

Neal said changes have come about since 1982, with newer and better satellite communications techniques, new video tape techniques, better cameras and computers. "NBC is now investing about three quarters of a million dollars in Ku-band satellite techniques for its affiliates, for instance," he said. The network's 200 affiliates will be able to receive downlinks directly from satellites, and 10 of the affiliates will have uplink capabilities.

"The upshot is that pretty soon we can begin to originate more and more news from the affiliates, which is coming full circle in many ways."

Neal's coverage of the space

program really began in the 1950s at Edwards Air Force Base, where he reported on the high speed flight test programs underway then. Neal was the pool producer for the networks in 1961 during Alan Shepard's flight, and helped formulate plans for the first press conference from space during Apollo 12 in 1969.

Although Neal will no longer cover the space program regularly, he will still appear on the air as events warrant.

"Roy Neal's gain in his new job is our loss," said JSC Director of Public Affairs Harold S. Stall. "When you work in a business where it is necessary to relay large amounts of complex information, a person like Roy Neal is a genuine treasure. He has always been a pleasure to work with, and his reports have always met the high journalistic standards of impartiality and accuracy. We will miss him."

Scholarship honors Dr. Low

A scholarship fund in the name of the late Dr. George M. Low has been established at Rensselaer Polytechnic Institute to honor the former JSC Deputy Director, Apollo Program Manager and NASA Deputy Administrator.

Low, 58, was President of Rensselaer at the time of his death July 17.

"I can think of no better living memorial to George Low than an educational scholarship," said JSC Director Gerald D. Griffin. "It is fitting to honor his memory by establishing a scholarship which promotes excellence at an educational institution which he loved and served so well. Those of us who knew him and worked with

him learned and gained much by the experience. I am glad to see that future generations of students will have an opportunity to learn from an endowment which bears his name."

Low became the 14th President of Rensselaer in June 1976. During his eight-year tenure, he developed a long-range plan to dramatically increase graduate teaching and research programs, while maintaining the excellence of the undergraduate curriculum and the school as a major technological institution. He established a Center for Industrial Innovation, comprising separate centers for research in interactive computer graphics, manufacturing produc-

tivity and technology transfer, and integrated electronics. When the Center is completed in 1986, it will be called the George M. Low Center for Industrial Innovation.

Low also initiated development of the 300-acre Rensselaer Technology Park, which he saw as an East Coast counterpart to Silicon Valley in Northern California.

A special memorial service for Low will be held in September after students have returned for the fall term.

Contributions to the George M. Low Memorial Fund may be addressed to: Office of the President, Rensselaer Polytechnic Institute, Pittsburgh Building, Troy, NY 12181.

ACTS contract signed

(Continued from page 1)
GHz). ACTS is designed to explore techniques of frequency reuse to be applied to present frequencies and overcome the technical problems associated with utilization of the 30/20 GHz band.

Domestic satellites presently operate with a single, continuous radio signal focused over the contiguous United States. The ACTS system will provide similar coverage via many spot beams, both fixed and scanning.

When operational, ACTS technologies will allow two basic types of service: trunking and customer premises service (CPS). Trunking service would accommodate the high-volume user in metropolitan areas. A typical operational system would serve 10 to 20 trunking

Earth-station areas, each with a dedicated fixed spot beam. CPS users, on the other hand, employing small and inexpensive Earth stations located at their plant or office, would be served by either fixed beams or scanning spot beams.

A unique capability offered by these advanced operational systems derived from ACTS technologies will be satellite switching. In conventional satellite systems, messages must be switched to their destination by means of ground-based distribution networks. With an on-board computer, message switching in the ACTS system takes place on the satellite itself, greatly simplifying ground-system design. With this approach, all terminals in the system will be interconnected through on board routing and

switching systems.

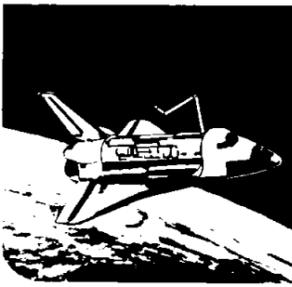
All satellite activity, including scheduling and message switching, will be controlled by a master control station. The MCS will be responsible for both satellite control and overall network control.

Thus, the 30/20 GHz operational system will be comprised of four major elements: (1) the satellite; (2) trunking earth stations; (3) customer premises terminals; and (4) the master control station.

NASA has been in the forefront of experimental space communications since the early 1960s when such projects as ECHO, RELAY, TELSTAR and SYCOM II established the feasibility of communications via a satellite in geosynchronous orbit.

NASA
Lyndon B. Johnson Space Center

Space News Roundup



The Roundup is an official publication of the National Aeronautics and Space Administration, Lyndon B. Johnson Space Center, Houston, Texas, and is published every other Friday by the Public Affairs Office for all space center employees. Roundup deadline is the first Wednesday after publication.

Editor: Brian Welch

Opportunities to rise with workload

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to be adequately managed for the next three decades or more.

This means that to a greater degree than is now done with the Space Shuttle, federal employees "will be doing hands-on engineering," rather than supervising contractors.

Where the juggling comes in, Griffin said, is in building that in-house SE&I capability while maintaining a fairly steady level of 3,200 federal employees and continuing to devote large amounts of time and energy to the Shuttle.

"It is critical that we not slacken our Shuttle efforts. We can't mess up," he said. "If we mess up the Shuttle, we won't have a Space Station, and if we don't have a Space Station, NASA probably does not have much of a future as a space research and development agency.

"There is a lot of work left to do on the Shuttle, and we are going to be involved. There are still a great many residual development issues to be addressed. We simply have things we have to fix. We are also at a point in Shuttle where we see the need for improvement in ground facilities and onboard systems, and we'll be working towards that.

The Space Station

"The Space Station Program will be characterized by a lot of in-house effort," Griffin stressed. "We intend to build an SE&I capability that will last for the duration of the program. The Station will reach an Initial Operating Capability, or IOC, in the early 1990s, and then grow and expand. We want to embed the capability to make that happen within the government."

The Space Station Phase A work now underway, he said, is quickly leading to the beginning of Phase B (definition and design). A Source Evaluation Board, chaired by Space Station Program Manager Neil Hutchinson, is meeting now and plans to release a Request for Proposals to industry in September. The RFP, Griffin said, will be out for two months and contracts will be awarded in April 1985. "That is all being done in one third less time than NASA has ever taken with any other major procurement of this type," Griffin said.

"The task has been Herculean," he said, for the people working in the Space Station "Skunk Works" in the Nova Bldg.

In describing the major role JSC will play in the program, Griffin listed the responsibilities which have been assigned to the Center: "The responsibilities include program management, plus a great many of the features of the Space Station. JSC will be responsible for the large integrating structure, the spine or the keel of the Space Station; for airlocks; for power and thermal gimbals; for the STS interfaces; for the entire thermal control system; for the remote manipulators; for EVA equipment; for guidance, navigation and control; for communications and tracking; for data systems in their totality; for the habitation module. During Phase B, we will be responsible to Level B for SE&I and for the overall systems architecture analysis. We will also be responsible for a number of items later on, in the advanced development phase: environmental and life support, thermal control, communications and tracking, advanced EVA systems, human productivity and the data processing system.

"It is a large and diverse job, and we have to do all of that plus maintain our abilities with the Shuttle."

Managing the task

Doing all of this, Griffin said, will require that changes be made and that a great deal of emphasis be given to efficient, "lean and mean" management.

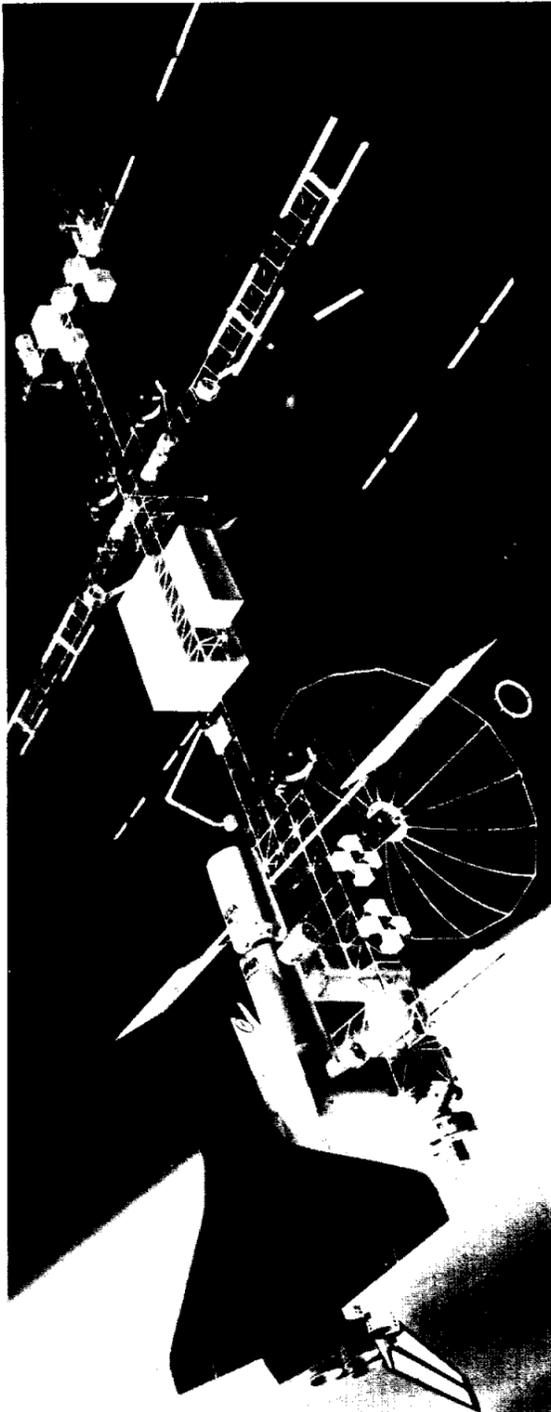
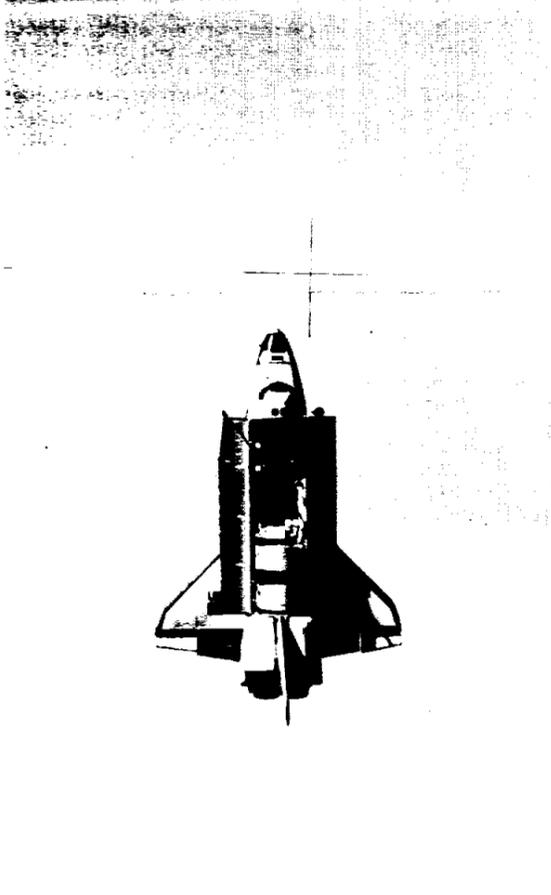
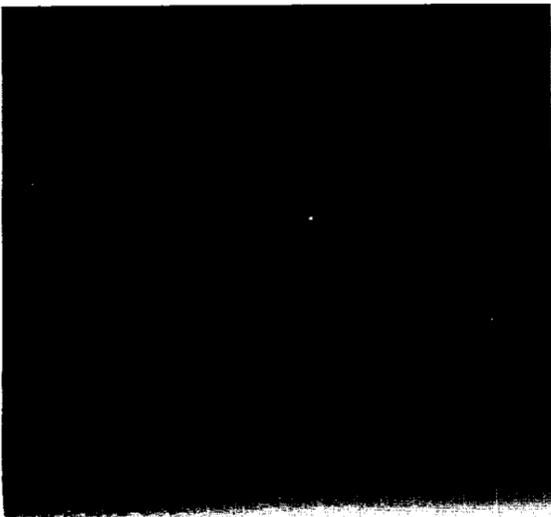
"We will have to keep the Station Program and Project offices as lean and mean as we can, and we will have to do the same for Shuttle. We will have to make maximum use of our line organizations in a matrix fashion to get the job done. We will have to slowly, carefully and gracefully change Shuttle Program and Project office staffing to smaller levels. We will have to move some people from those roles into Space Station, and others back into the line organizations to underpin both programs. We will have to know where we are fat and



"Make no mistake. Our plate is very full. But it sure beats the alternative."

People and facilities

"The people of JSC are the key ingredient to our success, and they have been for over 20 years.



JSC faces heavy management, research, development and operational responsibilities "for a virtually unending period of operations at least on a horizon we can realistically deal with."

where we are lean. We will have to cut formal task agreements, make hard contracts between program, project and line organizations and spell out who does what and how many people it will take. And then we have to stick to it."

Another management approach, he said, will be to consolidate the many Shuttle contracts at JSC into two major contracts, which go by the acronyms STSOC and FEPAC. STSOC, or the Space Transportation System Operations Contract, will free up federal employees by consolidation. "The idea is to free up people by getting fewer and fewer intersections between contractors and letting them operate those intersections themselves. Federal employees will have less to say about day-to-day Shuttle operations, but the government will continue to be in charge. We are not getting out of the flight operation business," Griffin said.

FEPAC, or the Flight Equipment Processing Contract, will take the 14 to 16 contracts dealing with all flight equipment for the Shuttle and combine them into one. "We will consolidate and do the same thing with less federal employees, freeing them up for the Space Station."

JSC is also exploring the possibility of handing some Shuttle tasks to the Kennedy Space Center. "We're looking at such roles as problem resolution from flight to flight. KSC is already involved in that, and they believe they have a lot of very talented people who could handle that role.

The Center has also had to get out of certain areas, he said, pointing to Earth resources work as an example. "It was an agonizing decision to get out of Earth resources. But funding dwindled, and the people or the billets involved in that work can be applied elsewhere."

Seventy-five percent of our people are probably the best in NASA at what they do, and the other twenty-five percent hold their own. We have a super workforce and we are stable, but there are some problems," Griffin said.

One problem is maintaining an upward growth potential. "Our average grade is high, one of the highest in the Agency. This is good and bad, but it is natural, given the kinds of things we do here. Our challenge will be to hire a larger number of fresh outs from college. We have to keep bringing in young blood."

Griffin said turnover at JSC is low, one reason why younger engineers and administrative people are not hired in greater numbers. "And I tend to think that is because this is a good place to work. People enjoy what they do.

But maintaining that environment will take investment, effort, and

management creativity, he continued. Much of the equipment used at JSC, whether program related or not, is at least 20 years old and much of it predates the Center, he said.

Management will also seek to revitalize opportunities for engineers. "We want to provide more opportunities for engineers to do hands-on work," he said. "They want to get their hands dirty, and we want to see them get their hands dirty. We recently built in-house an Orbital Refueling System for the 41-G flight. It was done in the Engineering Directorate with a lot of help from Center Operations. We designed, built and tested in-house a really beautiful piece of equipment. It was done by a super group of people. We want to take on bigger and bigger tasks like that. It is especially important that our younger people get a chance to get their hands dirty with real hardware before they get caught up in the paper battle."

Griffin then outlined his organizational philosophy and how it fits in with providing challenges and opportunity for employees. "I believe in simplicity, and in delegation of authority. The three 'Directors Of' — Cohen, Charlesworth and Kelly (Director of Research and Engineering, Space Operations and Center Support, respectively) really run their own areas and that is how I like it. I think good communication is necessary, and that is one reason for this meeting. I would like to see JSC as an organization without too much overlap. We need to be lean and efficient. I would like to see more mobility of leadership. Most of our senior level folks have moved around from position to position and this is good. It revitalizes people and brings new approaches to jobs. I think it is a good thing when we move things around and give people a new crack at the apple."

National pressures

The challenges facing JSC are not taking place in a vacuum, Griffin reminded the managers. "NASA is in a whirlpool of new opportunities, new ideas and new pressures right now." He pointed to the new national space commercialization policy, the debate over expendable launch vehicles, to Shuttle performance, pricing of Shuttle flights, and the relationship between NASA and the Department of Defense as areas where national debate is underway. All of these factors, he said, form into a national debate over and a national direction for the space program. Events on the national level will determine what takes place on the Center level.

"Like aviation, we are seeing much more private investment in space. We will ultimately be successful at our jobs if that happens.

Our role will be to provide a base of expertise and wisdom to the nation when it comes to space flight.

The bottom line, Griffin said, is that "there are no big overt changes for JSC, not in the foreseeable future. We have a lot of work to do and we have a long range future. I know JSC will rise to the occasion because it always has."

Following his survey of the state of the Center, Griffin took questions. One question dealt with an issue of immediate concern to every employee at JSC — the need for a new phone system. "We are going to get one, and about the end of the year we will begin to push over to a new system," Griffin said. He said the Center also needs to pursue teleconferencing technologies which could save time and travel money.

After the questions, Griffin asked the managers if they thought the session was useful. The response was an enthusiastic round of applause. "Well, maybe we can try this again in different areas around the Center. Now let's go to work."

Cookin' in the Cafeteria

Week of August 20 - 24, 1984

Monday: French Onion Soup; Beef Chop Suey, Polish Sausage w/German Potato Salad, Breaded Veal Cutlet (Special); Okra & Tomatoes, Green Peas. Standard Daily Items: Roast Beef, Baked Ham, Fried Chicken, Fried Fish, Chopped Sirloin. Selection of Salads, Sandwiches and Pies.

Tuesday: Split Pea Soup; Salisbury Steak, Shrimp Creole, Fried Chicken (Special); Mixed Vegetables, Beets, Whipped Potatoes.

Wednesday: Seafood Gumbo; Fried Catfish w/Hush Puppies, Braised Beef Rib, BBQ Plate, Wieners & Beans, Shrimp Salad, Stuffed Bell Pepper (Special); Corn O'Brian, Rice, Italian Green Beans.

Thursday: Chicken Noodle Soup; Beef Stroganoff, Turkey & Dressing, BBQ Smoked Link (Special); Lima Beans, Buttered Squash, Spanish Rice.

Friday: Seafood Gumbo; Broiled Turbot, Liver & Onions, Fried Shrimp, Meat Sauce & Spaghetti (Special); Green Beans, Buttered Broccoli, Whipped Potatoes.

Week of August 27 - 31, 1984

Monday: Beef & Barley Soup; Beef Chop Suey, Breaded Veal Cutlet w/ Cream Gravy, Grilled Ham Steak, Weiners w/Baked Beans (Special); Buttered Rice, Brussels Sprouts, Whipped Potatoes. Standard Daily Items: Roast Beef, Baked Ham, Fried Chicken, Fried Fish, Chopped Sirloin. Selection of Salads, Sandwiches and Pies.

Tuesday: Celery Soup; Fried Shrimp, Pork Chop w/Applesauce, Turkey a la King, Chinese Pepper Steak (Special); Au Gratin Potatoes, Breaded Squash, Buttered Spinach.

Wednesday: Seafood Gumbo; Fried Catfish w/Hush Puppies, Braised Beef Ribs, Mexican Dinner (Special); Spanish Rice, Ranch Beans, Buttered Peas.

Thursday: Green Split Pea Soup; Corned Beef w/Cabbage & New Potatoes, Chicken & Dumplings, Tamales w/Chili, Hamburger Steak w/Onion Gravy (Special); Navy Beans, Buttered Cabbage, Green Beans.

Friday: Seafood Gumbo; Deviled Crabs, Broiled Halibut, Liver & Onions, BBQ Link (Special); Buttered Corn, Green Beans, New Potatoes.



Shown here are the Dudes, winners of the JSC Men's B League Softball Championship. Front row, left to right, are Ralph Anderson, Dickie Arndt, Barry Oliphant, Mavis Greif (scorekeeper), Manager Jim Porter and Tom Moore. Back row, left to right, are Rich Fowler, Ron Lentz, Ron Epps, Jim Geisler, Gerry Bryan and Jerry Greif. Players not pictured are Mario Delgado, Mark Jernigan, Jim Pawlowski, Harry Prestigard and Jack Boykin.

Roundup Swap Shop

Ads must be under 20 words total per person, double spaced, and typed or printed. Deadline for submitting or cancelling ads is 5 p.m. the first Wednesday after publication. Send ads to AP 3 Roundup, or deliver them to the Newsroom, Building 2 annex. No phone-in ads will be taken. Swap Shop is open to JSC federal and on-site contractor employees for non-commercial personal ads.

Property & Rentals

For sale: Sunmeadow 4-2½-2, den, FPL, breakfast room, both formals, fenced. Call 331-2361.

For lease: Wood Meadow 3-2-2, near Ellington Field, FPL, \$475/mo. Call 480-6325 after 5 p.m.

For lease: Camino South 4-2-2, cable hookup, fans, FPL, \$625/mo. Call Jim, x2651 or 488-5601.

For sale/lease: Lake Shore condo, 2-2-2, like new, below market, assume 11% non-escalating loan, \$57,700 or \$550/mo. plus \$550 deposit. Call Regelbrugge, x2761 or 484-3318.

For sale: Walden on Lake Conroe timeshare condo, sleeps 4, RCI exchange privileges, great deal for tennis, golf and boating lovers. Call Don, 280-4257 before 4 p.m.

For sale: Middlebrook 3-2-2, brick, wet bar, new carpet, fenced, open living area, FPL, \$77,000. Call Jim, x2375 or 488-0658.

For lease: Baywind II condo, 1 BR, W/D connections, FPL, kitchen appliances, pool, exercise room. Call Jim Wiltz, x5437 or 944-0451 after 5 p.m.

For sale: 1.8 acres in Friendswood, all utilities, \$29,500. Call Janice, x5867 or 482-6888.

For lease: Heritage Park 4-2-2, shady yard, new paint, drapes and mini blinds, near pool, \$510/mo. plus deposit. Call Karl, x2411 or 333-3544.

For rent: rooms in League City house, furnished bedroom, den, 3/4 bath, private entrance, kitchen/laundry privileges, phone/utilities provided, \$65/week. Call Joyce, 486-4420, x413 or 554-7380.

For lease: 1 BR condo, ceiling fan, W/D, pool, tennis. Call Aggie, x5911, 538-1227 or 538-3602.

For lease: Heritage Park 3-2-2, near Baybrook Mall, fenced, SPL, formal dining, cathedral ceiling, ceiling fans, over 1,600 sq. ft., \$525/mo. plus deposit. Call 486-6543 or 333-0688.

For lease: Baywind II 2-story studio condo, 1-1-1, FPL, W/D connections, pool, tennis, exercise room, \$375/mo. Call Elaine, x5441 or 334-2402 after 5 p.m.

For lease: 1,500 sq. ft. townhouse near NASA, 2-2½-1, FPL, garage opener, fenced patio, balcony, pool, \$540/mo. Call 452-3361 evenings.

For lease/purchase: Bayview 3-2-2, brick, fully carpeted, Clear Creek schools, apply rent to purchase, \$440/mo. Call 486-0462 after 6 p.m.

For sale: Handyman special in Clear Lake Shores, new roof, 3-2 on 5 wooded lots, equity and assume \$382/mo. Call 480-7200.

For lease: Baywind 2-1½, ground floor, W/D, furnished, 6 month minimum lease, two parking spots, \$470/mo. plus deposit plus utilities. Call 333-3992.

For lease: Townhome 2 miles from JSC, 2-2½-2, open living w/FPL, 1,550+ sq. ft., like new, \$550/mo. (1st, last & deposit), no pets, immediate occupancy. Call 333-2636 after 5 p.m.

For sale: 1982 Champion mobile home, 14' x 64', 2-1, all appliances, W/D connections, located in Northeast Park, assume \$286/mo. with \$500 down. Call Anselmo, 453-1877.

For lease/purchase: League City 3-2-2, brick, FPL, ceiling fans, immaculate, assumable 9.5% FHA. Call 332-4492.

For sale/lease: Kirkmont 3-2-2,

fence, new paint, \$485/mo. with deposit and references or low \$60's with owner financing. Call 474-3319 after 4 p.m.

For sale: Friendswood 5-3½-2½, formals, paneled family room and study, large kitchen, screened patio, 9 acre in secluded area. Call 482-6638.

For sale: 3/4 acre waterfront lot with access to excellent bass fishing in Brazoria County. Call Don, 280-4257 before 4 p.m.

For lease: Wedgewood 3-2-2, near Baybrook Mall, large living room, formal dining, FPL, cathedral ceiling, quiet cul-de-sac, nice neighborhood, \$550/mo. plus deposit. Call 486-6543 or 333-0688.

For sale: 101 acre farm, house, furnishings, tractor, equipment, utilities, bass ponds, fruit, pecan and oak trees, \$975/acre and 1/2 minerals. Call Don, x4606 or 488-8105.

For lease: Countryside 4-2-2, one year old, fenced, near pool, park, tennis, \$575/mo. Call Tim, x2276 or 280-5226.

For sale: Townhome, 3-2½-2, large master w/deck overlooks pool, five minutes to JSC, Earth tones throughout, five years old, like new, 1,730 sq. ft., \$74,500. Call 333-2636 after 5 p.m.

Cars & Trucks

1976 Ford LTD, AC, PS, PB, AM/FM/stereo, good condition, \$1,200 OBO. Call Donzelle, 488-1621.

1982 Cutlass Supreme, white w/ burgundy interior and vinyl top, AM/FM/cassette, mag wheels, AC, clean, 26,000 miles, \$6,500. Call Denise, x4488 or 434-9469.

1973 MGB, black with silver trim, good condition, no more MGBs made, \$4,500. Call Linda, 280-3501 or 422-5123 after 6 p.m.

1979 Chevy Malibu Classic, 53,000 miles, 6-cyl., \$3,200 OBO. Call Vincent, x3035 or 333-1316.

1980 Cutlass, extra nice, engine replaced with new 1984 diesel with transferable 12,000 mile/12 month warranty, new radials, \$5,000. Call Thompson, x4121.

1975 Ford Gran Torino station wagon, all power, excellent condition, \$1,050 neg. Call 482-2471.

1979 Ford LTD, original owner, loaded, AC, AM/FM/8-track, electric windows and locks, \$2,500. Call Sharon, x5094.

1982 Mustang GL, 3-door, auto, AC, PS, PB, AM/FM/Cassette, white, 6 cylinder. Call Lew, x2544 or 495-1122 after 6 p.m.

1973 Ford Gran Torino Sport, AC, PB, PS, mag wheels, excellent mechanical condition, good body, \$1,200 OBO. Call Scott, x2676 or 538-1757.

1977 Mercury Cougar XR-7, all power, AC, low miles, one owner, med. blue, white vinyl top, excellent condition, \$2,495. Call 280-0454 evenings.

1982 Camaro Berlinetta, loaded, excellent condition, 16,700 miles, \$8,200. Call Janice, x5867 or 482-6888.

1976 Pontiac Sunbird, new 231 cu. in. V-6, new trans., new starter, AM/FM, PS, PB, tilt, good tires, locking sport wheels, cloth seats, no rust, \$1,100. Call 334-3370.

1977 Jeep Cherokee 4WD, 4 dr., 6 cyl., AC, cruise, runs well, clean, \$2,695. Call Clete, x2191 or 484-8375 evenings.

1980 Mazda GLC, 4 door, hatchback, 5 spd., AM/FM/tape, light blue, \$2,850.

Call 534-7426.

1975 Chevy pickup with 8 ft. cabover camper, AM/FM/cassette, PS, auto trans., 78,000 miles, good engine. Call Randy, 482-4083.

1975 Dodge Coronet, AC, AM/FM, auto, very good condition, \$1,100 neg. Call Bernadette, x4296 or 482-8136 after 5 p.m.

1972 Fiat X1/9, royal blue, 5 spd., radio, body-interior-engine very good, fun to drive eye catcher. Call Kay, 480-1889, x226 or 480-7396.

1982 Plymouth Gran Fury Salon, 4 dr. sedan, low miles, AM/FM, AC. Call 996-9481 after 6 p.m.

Boats & Planes

Sails, mast and center board for Dolphin Sr., best offer. Call Karl, x2411 or 333-3544.

Two sailboards for windsurfing, quality beginner and advanced board with attractive Gaaftra sail, like new, \$550. Call Horton, 486-4987.

Sculling shell, like new, one place, with car racks, \$1,500. Call Horton, 332-1309 after 5 p.m.

Hummingbird Super 60 depth sounder, \$115; Minn Kota trolling motor, \$125; 15' Skeeter bass boat with 50 HP Johnson motor, \$2,100. Call Don, 280-4257 before 4 p.m.

Audiovisual & Computers

TRS-80 Model 100 portable computer, 24K, two months old, built-in modem, good word processing, with Olivetti ink jet 110 cps printer with tractor feed, misc. cables, whole package for \$985. Call Steve, x5111.

Commodore 64 computer plus one joystick, \$150. Call Tom, x4645 or 482-9172.

Pertec 5.25 in. floppy drive w/power supply, \$120; Tandon 5.25 in. DSDD floppy w/power supply, \$225. Call Tom Harmon, x3511 or 480-6075 after 5 p.m.

Full range acoustic suspension loudspeaker, walnut veneer cabinet, perfect condition, \$40. Call 488-3966.

Sanyo portable AM/FM stereo and cassette, new, paid \$125, sell for \$85. Call Joan, x3057 or 486-1058 after 5 p.m.

Musical Instruments

Kay five-string banjo with case and instruction book, \$75. Call Steve, x5111. Yamaha trombone, \$145. OK condition but needs minor part, perfect for beginning band student. Call 482-4260 evenings.

1982 Wurlitzer Spinnet piano, like new, paid \$1,800, will take \$1,000. Call 280-8164.

Photography

Canon telephoto lens, 135mm, fl.28, bayonet mount, barely used, includes sun shade and case, \$105. Call Risch, x5131 or 480-6097.

Mimiya TLR C220, w/three sets of lenses, \$545. Call 473-3063.

Household

GE oven hood, white with fan and light, never used, \$60. Call Fred, x2391 or 480-1086 evenings.

Microwave oven, Rockwell/Admiral, \$50. Call 946-6296.

Coffee table, \$30. Call Brent Fontenot, x4981.

Antique mahogany drop-leaf table with 3 leaves, opens to 90" with all leaves, \$125. Call Donna, x4571 or 479-8562 after 4:30 p.m.

Kenmore heavy duty washer and dryer; washer has push buttons, dryer is solid state with wrinkle guard and tennis shoe rack, excellent condition, \$250/pair. Call Donna, x4571 or 479-8562.

Gas dryer, \$125 or trade for electric dryer; large upright freezer new. Call J. Poindexter, x4241 or 486-4113.

Beautifully hand-carved antique china cabinet, excellent condition, \$1,750 OBO. Call Janice, x5867 or 482-6888.

Kenmore gas range, 30", dual continuous cleaning ovens, electronic ignition, new, never used, slight shipping damage, retails for \$950, will sell for \$500. Call Ed Lattier, x5561.

Maple twin bed, boxsprings, mattress, frame, good condition, \$70. Call Donna, 480-8190, x54 or 480-5266 after 5 p.m.

China cabinet and formal dining table with four chairs, mint condition, \$650. Call 482-3697.

Sofa, like new, 84", \$250; child's desk and chair, \$50. Call 488-1262.

17 cu. ft. Frigidaire refrigerator/freezer, \$200. Call S. Lenett, 280-3616.

15 cu. ft. chest freezer, 2 years old, \$300; MTD 25" riding mower with 5 HP Briggs and Stratton engine, \$300. Call Jerry R., x4971 or 488-5553.

Cycles

1979 Honda Twinstar, 185 cc, two cyl., 9,000 miles, fun motorcycle for around town driving, gets 75 MPG, \$450 OBO. Call Steve, x5111.

1979 Yamaha YZ100 dirt bike, excellent condition, many extras, \$425. Call 474-3507.

Little Dude motorcycle trailer, holds three. Call Curt, x2901.

Pets

Puppy, free to good home, 9-10 mos. old, very smart, loves children. Call Randy, x4521 or 482-4083.

AKC Chow Chow puppies, seven red females, born 8/2/84. Call Pat, x4136 or 482-8233 after 5 p.m.

Siamese cat, free to good home, male, 9 mos. old, full blood, no papers. Call Valerie, x6393 or 559-1452.

Miscellaneous

Rent a mini motor home, self-contained including onboard power plant, roof air, the comforts of home on wheels. Daily or weekly rates. Call Dave, x5111 or 480-0202 after 5 p.m.

Sears 10 HP riding mower, 36-inch deck, electric starter, like new, \$700. Call Sharon, x4763 or 482-3078 after 6 p.m.

Two air mattresses, with inflatable head rest, \$20; two sleeping bags, \$20; all in excellent condition. Call Bob, 482-5984 after 5:30 p.m.

NASA Mixed Bowling League meets Aug. 21, 6 p.m. at Alpha Bowling Center. Call Mike, x2146 or 488-6475 for more information.

AR-15 rifle, never used, still in box. Call Joan, x3057.

Astronomers: Unitron Unihex w/ 25mm Huygens, 18mm Kellner, 9mm Achrom, and 5 mm Orthoscopy in wood case, \$40. Call Samouche, x4727.

Portable Smith-Corona manual typewriter, \$30; record cabinet, 16" x 24",

\$15. Call Thompson, 488-8389 after 5 p.m.

Pogo stick, \$5; erector set, \$10; chemistry set, \$5; lite Brite, \$3; Barbie beauty center and car, \$5. Call 474-3507.

Remington 243 automatic with 3 x 9 Redfield scope, never used, \$300. Call 280-8164.

1973 VW engine, misc. VW parts. Toyota pickup seat with tracks and like new, original tires and wheels and hub caps for 1981 Toyota pickup. Call Underhill, x2135 or 334-1303.

Kenmore window air conditioner, 10,000 BTUs, used two summers, asking \$275. Call Allen, x3781 or 480-2312 after 5 p.m.

Large Craftsman mower, 5 HP, 110V AC electric start, self-propelled, excellent condition, \$325. Call 921-7212.

6,800 Watt surge, 4KW continuous, 110/220VAC and 12VDC electric start generator, used less than 10 hours, \$726.09. Call Roy, x3591 or 488-6326.

Four Uniroyal steel belted Chevy Silverado radials, P235/75R15, and rally wheel rims, 8,000 miles, \$275. Call 333-1472 after 6 p.m.

Full-size pool table, \$100. Call 473-3063.

MURP revealed

In the August 3 *Roundup*, readers with knowledge of an obscure acronym—"MURP"—were asked to contact the JSC History Office if they had any idea what it meant. Those interested in the progress of historical investigation will be pleased to know that an answer has been found.

The acronym MURP, it turns out, stands for "Manned Upper Stage Reusable Payload," and the concept was part of a study done by the U.S. Air Force in the 1960s.

MURP was one of a number of concepts studied in the 1950s and 1960s which ultimately led to the design of the Space Shuttle. As part of their work on a history of the Shuttle Orbital Flight Test program, Rice University Historians John Mauer and Joe Guilmartin are interested in all of these studies.

Specifically, they are seeking additional information on a Lockheed study for a vehicle called "Starclipper," and for two Boeing studies on the Boeing Model 176 and the Boeing Model 920-86. All three were designs for reusable manned orbital vehicles.

Readers with knowledge or documentation on these or any other reusable manned vehicle studies are asked to contact Mauer or Guilmartin at x2838.